The Effectiveness Of Additional Math Practice

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In the West Shore School District (WSSD), the students take the Keystone Algebra exam at the conclusion of the course, Algebra I. In recent years, this course has been offered from September through June in 8th through 10th grade with the exam being administered in May. The results from these tests are released in August of the same year. If a student does not pass the Algebra I Keystone exam, then that student will retake the exam as many times and he/she wishes through the end of the Grade 11 year. The student’s best combined scores of both Module 1 and Module 2 are derived from the multiple attempts (West Shore School District - Keystone Exam Information, n.d.).

Teachers in WSSD are tasked with helping students achieve a higher score on any and all tests. In this case, the focus was the Algebra I exam. In the emerging field of learning analytics, also known as educational data mining, data relative to learning is measured, collected and analyzed for the reporting in order to better understand learning processes and optimizing learning methods and environments (Siemens, 2011). The data was collected from the 2016 Algebra I Keystone Exam for students enrolled in classes with Mrs. Trish Klinger, Business teacher at Red Land High School.

In order to maintain the highest level of student information confidentiality, the following guidelines were enacted:

**Transparency**

Student data will be used for the express purpose of designing instruction, analyzing data and revising instructional practices for higher student achievement. Data will only be used to identify students in the sample group 10th grade males with an IEP identifying the student needs additional support and practice in Math skills. Students will be identified by student number, not by name. Data will not be shared with any other institution and will stored anonymously upon student graduation

**Right of Access**

Data used for initial analysis via the Performance Tracker system which is a secure site requiring username and password to access data that District employees have the consent to use

Data collected with remain confidential within the limits of Family Educational Rights and Privacy Act (FERPA) and applicable state laws. Teachers can only see data pertaining to the students enrolled in the district. All students in the study are over the age of 13 so Children’s Online Privacy Protection Act (COPPA) does not apply. Data analysis for ongoing assessments will be store within the wssd.bz domain which requires a valid WSSD username and password for access.

**Accountability and assessment**

Trish Klinger, Business Department Head and Taylor Wiggins, Business department teacher at Red Land High School will be the only personnel with access to the assessment data and analyses. Within these parameters, student data will be analyzed for the purposes of assessing Algebra I proficiency and all safeguards will be employed to protect student identities.

The criteria for identifying students who would need additional help and practice to become more successful on the Algebra I exams included searching for students with Individualized Education Plans (IEPs). An IEP is a plan that is developed to ensure that a student with a legally identified disability and attends public schools received specialized instruction, individual help and attention where needed and other related services. An IEP is a legal document that public schools must follow and enumerates a child’s learning needs, the services that will be provided and how progress with be measured (Do-It, 2017).

The West Shore School District is enrolled in the Performance Tracker program provided through PowerSchool to capture test data and results. Performance Tracker allows teachers to see data for all the students currently enrolled in the district. This data can be viewed by graduation year/grade, race, gender, school year, and first or last name.

At Red Land High School, business subjects are taught to students in 9th through 12th grade. Given the 2016 year-end Algebra I Keystone results for the students on my roster, I noted that the majority of my students who had taken the exam were in the 10th grade. Furthermore, it was noted that the students who were identified as having a disability due to having IEPs scored lower than the other students in the same age range. Within that sub-group, male students with IEPs scored lower than female students with IEPs. Given that data, I sought a method to remediate the 10th grade male students with IEPs without singling them out to their classmates and peers.

Drilling down further, it was discovered that 10th grade male IEP students need more practice specifically with Math Operations, Real Numbers and Expressions. Business department faculty are not trained as Math instructors so practice of math skills is the preferred method of delivery rather than direct instruction. Further, our department did not have any discretionary funds available to purchase materials or software to aid in this endeavor. I searched for an online tool that would be provided at no cost to the district and would be engaging for my students to use. My program would be implemented with all of my students to maintain confidentiality so the tool needed to be educational and entertaining for all of my students.

The website [www.xpmath.com](http://www.xpmath.com) was found to be the most beneficial while maintaining a game-like atmosphere. It was decided that a new initiative entitled, “Fun Math Friday” would commence in all Business classes for all students. Within the website, there is a collection of interactive games for many types of math skills for students in grades 5 through 9. The games are based on the 2010 common core state standards, providing comprehensive coverage of math concepts and applications (Hui, n.d.). Each Friday that school is in session, students will access XPMath.com and play the games that provide practice in Math skills. As a teacher, I was able to set up Classrooms within the website to track my students progress and time spent on task. XPMath.com provides summative data for each student based on login. Students will be rewarded for their participation with homework passes and other school appropriate treats.

Each week, student participation data can be accessed and analyzed via the website. Traditional, paper-based tests to assess Math Operations, Real Numbers and Math Expressions will be administered to all students to determine effectiveness of the program within the specific group of 10th grade students with IEPs, both male and female. Students will also be asked to complete a survey, based on a Likert scale to assess their engagement and satisfaction with the program.

The effectiveness of this program will be evaluated based on the Kirkpatrick model. There are four levels within that model: Reaction, Learning, Behavior and Results. The following survey to assess students’ levels will be given:

* 1. Reaction
     1. What will help the students feel that the math practice is worthwhile?
     2. What will help the students feel successful?
     3. Do the students enjoy working in the software and what alternatives exist?
     4. How do we address personal learning styles?
  2. Learning
     1. Assess student knowledge and skill level prior to start of program to determine math level. Calculus students should not be working on Order of operations, real numbers, etc.
     2. Monthly assessments will determine student learning and levels of achievement to determine effectiveness of program
  3. Behavior – assessed via observations and interviews
     1. Assess weekly - Are the students engaged or are they bored?
     2. Assess monthly – Are students enjoying working in the software?
     3. Assess at end of marking period – Do students find the work meaningful and do they wish to continue in the program?
  4. Results
     1. Practice tests are given monthly to determine student achievement
     2. Student surveys will be given at the end of nine weeks to assess student engagement and progress.

At the conclusion of the school year, I will have collected data weekly, monthly and at the end of each marking period. By analyzing this data, I will be able to determine the effectiveness of this Math practice within the prescribed group. Further, by analyzing the Algebra I Keystone data from the following year, I will be able to further gauge the effectiveness of this Math Practice program. I will be able to say that this program is successful if the 10th grade male IEP students’ scores on the Algebra I Keystone exam improve in the areas of Math Operations, Real Numbers and Expressions.

References

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